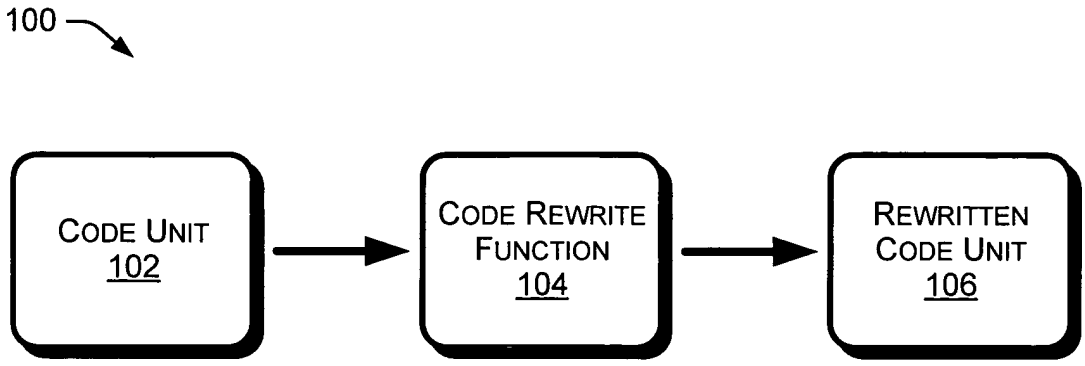
100
CODE UNIT
102
CODE REWRITE
FUNCTION
104
REWRITTEN
CODE UNIT
106

Fig. 1

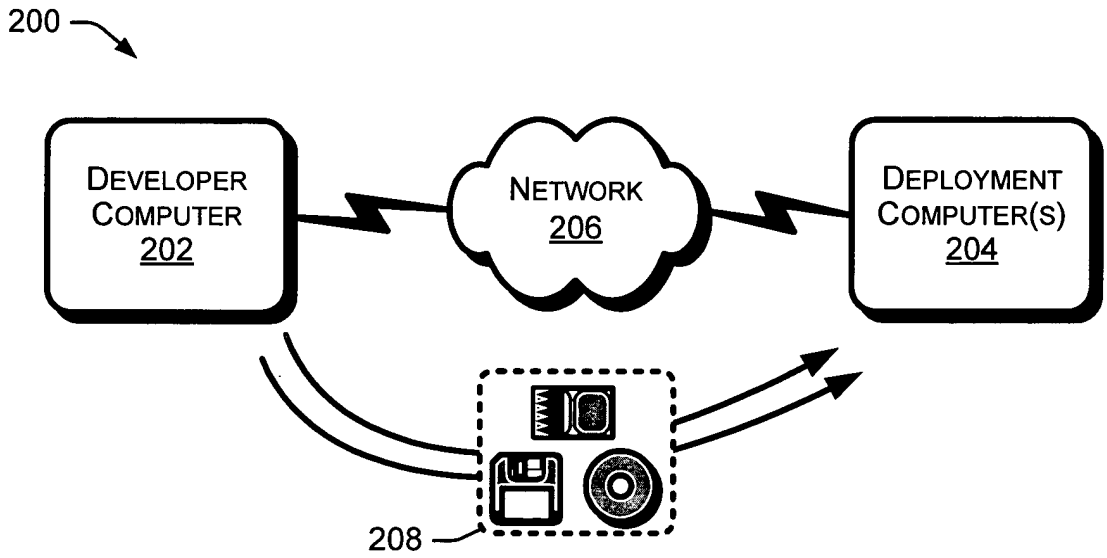
200
DEVELOPER
COMPUTER
202
NETWORK
206
DEPLOYMENT
COMPUTER(S)
204
208

Fig. 2

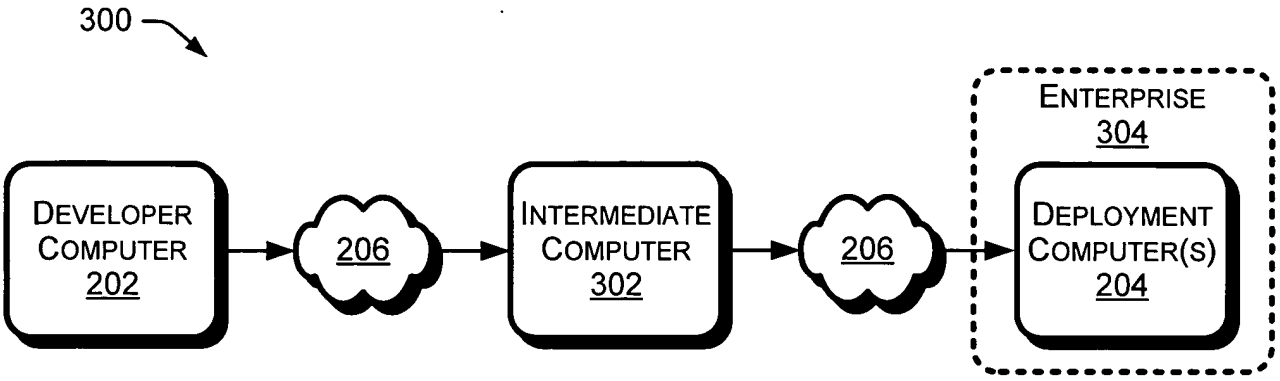
300
ENTERPRISE
304
DEVELOPER COMPUTER
202
206
INTERMEDIATE COMPUTER
302
206
DEPLOYMENT COMPUTER(S)
204

Fig. 3

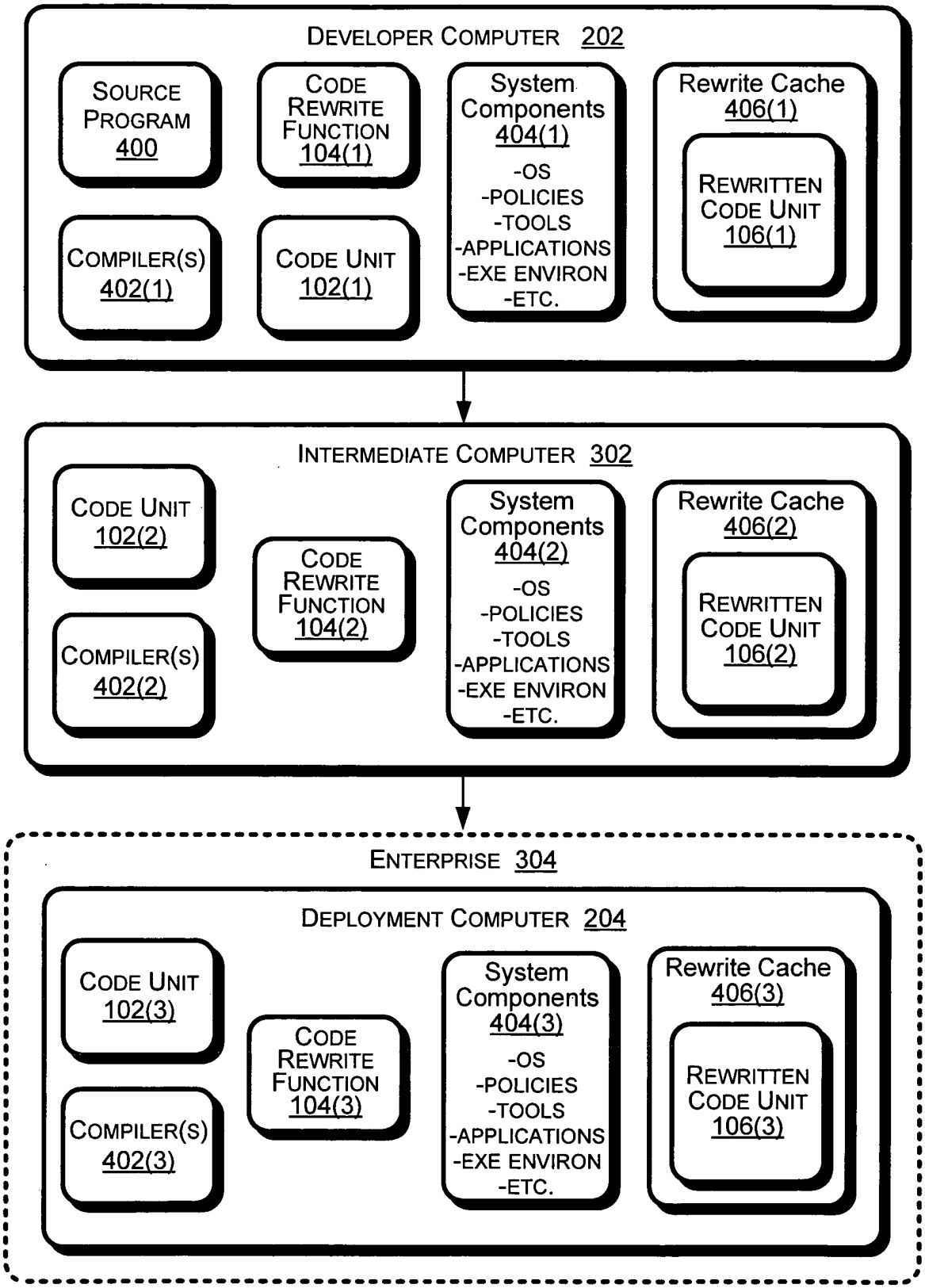
DEVELOPER COMPUTER 202
SOURCE PROGRAM 400
CODE REWRITE FUNCTION 104(1)
System Components 404(1)
-OS
-POLICIES
-TOOLS
-APPLICATIONS
-EXE ENVIRON
-ETC.
Rewrite Cache 406(1)
REWRITTEN CODE UNIT 106(1)
COMPILER(S) 402(1)
CODE UNIT 102(1)
INTERMEDIATE COMPUTER 302
CODE UNIT 102(2)
CODE REWRITE FUNCTION 104(2)
System Components 404(2)
-OS
-POLICIES
-TOOLS
-APPLICATIONS
-EXE ENVIRON
-ETC.
Rewrite Cache 406(2)
REWRITTEN CODE UNIT 106(2)
COMPILER(S) 402(2)
ENTERPRISE 304
DEPLOYMENT COMPUTER 204
CODE UNIT 102(3)
CODE REWRITE FUNCTION 104(3)
System Components 404(3)
-OS
-POLICIES
-TOOLS
-APPLICATIONS
-EXE ENVIRON
-ETC.
Rewrite Cache 406(3)
REWRITTEN CODE UNIT 106(3)
COMPILER(S) 402(3)

Fig. 4

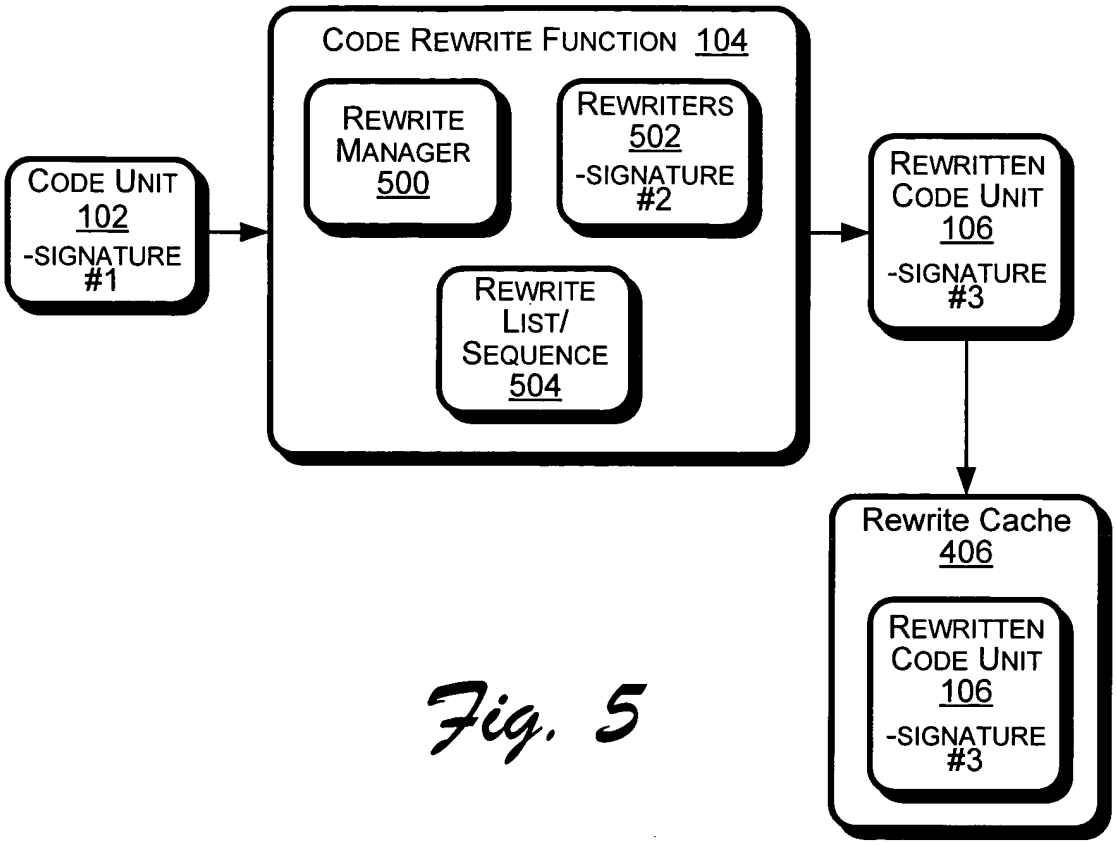
CODE REWRITE FUNCTION 104
REWRITE MANAGER 500
REWRITERS 502 -SIGNATURE #2
REWRITE LIST/ SEQUENCE 504
CODE UNIT 102 -SIGNATURE #1
REWRITTEN CODE UNIT 106 -SIGNATURE #3
Rewrite Cache 406
REWRITTEN CODE UNIT 106 -SIGNATURE #3

Fig. 5

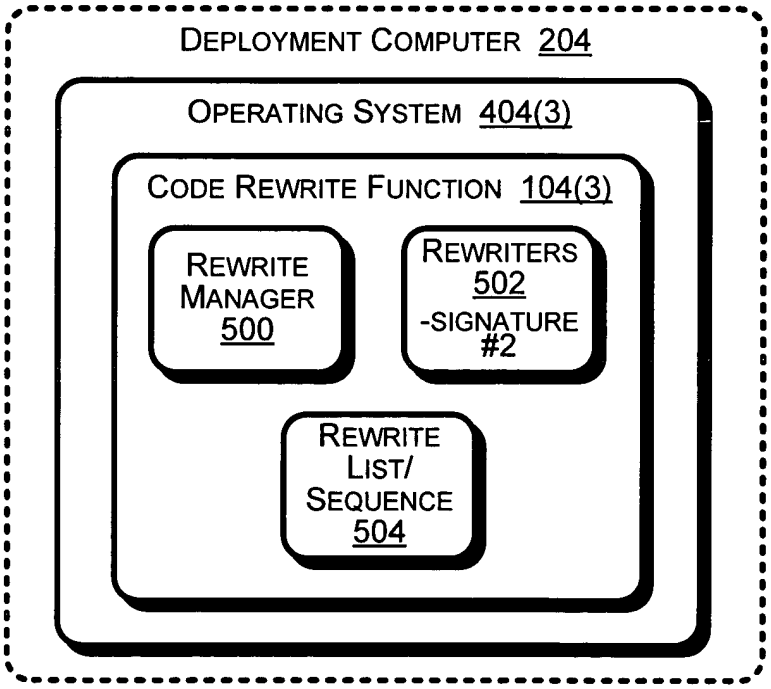
DEPLOYMENT COMPUTER 204
OPERATING SYSTEM 404(3)
CODE REWRITE FUNCTION 104(3)
REWRITE MANAGER 500
REWRITERS 502 -SIGNATURE #2
REWRITE LIST/ SEQUENCE 504

Fig. 6

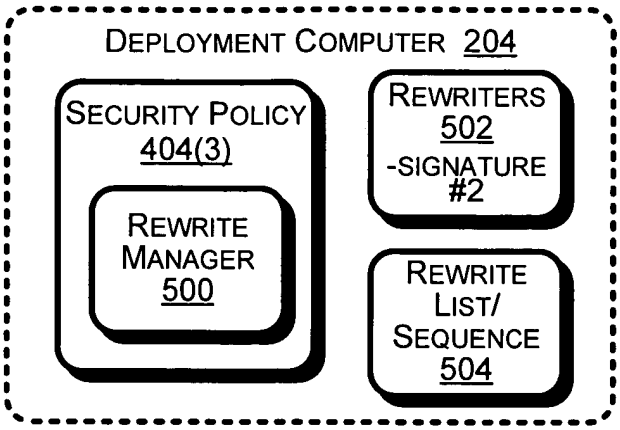

Fig. 7

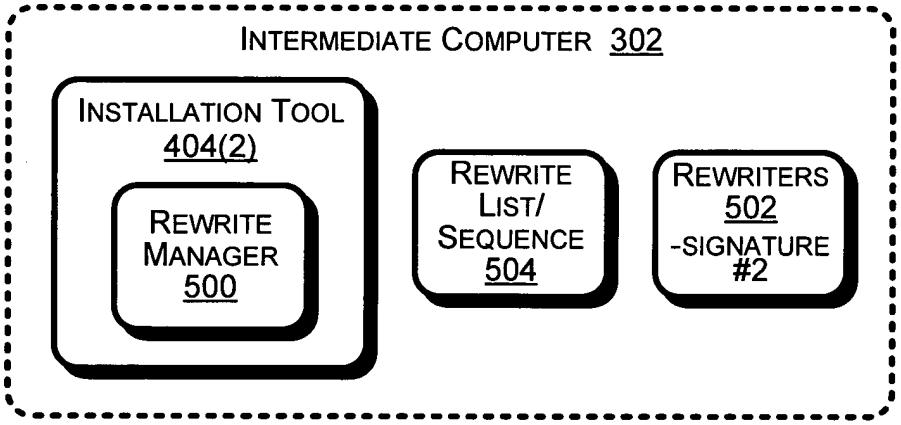

Fig. 8

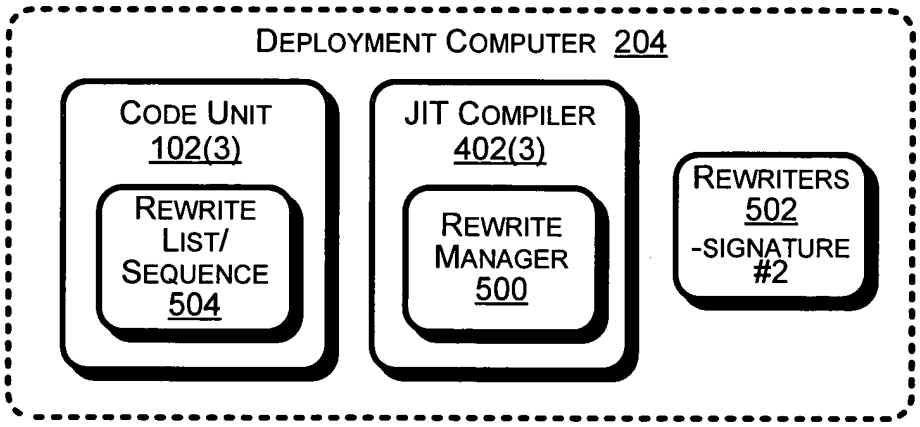

Fig. 9

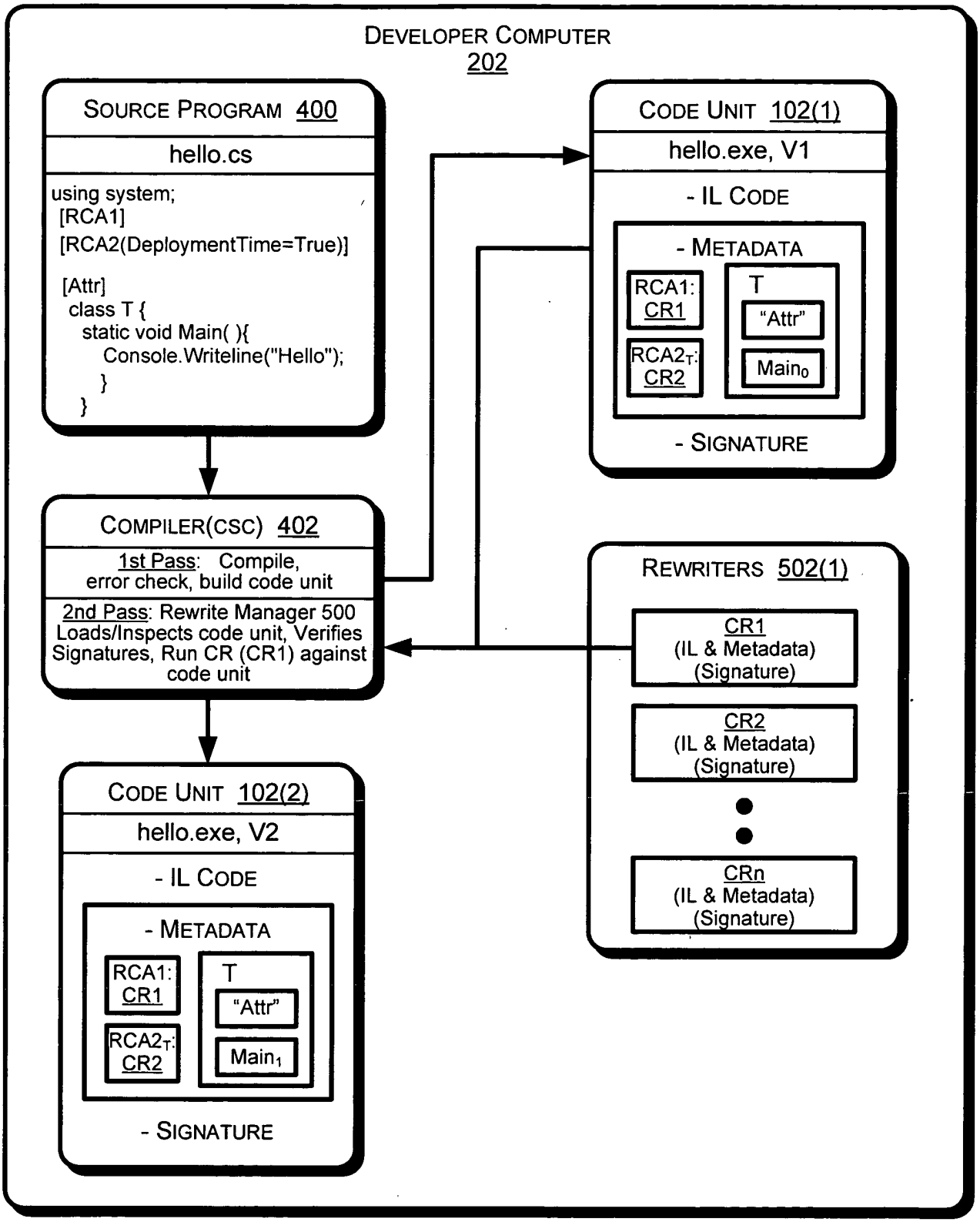
DEVELOPER COMPUTER
202
SOURCE PROGRAM 400
hello.cs
using system;
[RCA1]
[RCA2(DeploymentTime=True)]
[Attr]
class T {
static void Main( ){
Console.Writeline("Hello");
}
}
CODE UNIT 102(1)
hello.exe, V1
- IL CODE
- METADATA
RCA1: CR1
RCA2T: CR2
T
"Attr"
Main0
- SIGNATURE
COMPILER(CSC) 402
1st Pass: Compile, error check, build code unit
2nd Pass: Rewrite Manager 500 Loads/Inspects code unit, Verifies Signatures, Run CR (CR1) against code unit
REWRITERS 502(1)
CR1 (IL & Metadata) (Signature)
CR2 (IL & Metadata) (Signature)
CRn (IL & Metadata) (Signature)
CODE UNIT 102(2)
hello.exe, V2
- IL CODE
- METADATA
RCA1: CR1
RCA2T: CR2
T
"Attr"
Main1
- SIGNATURE

Fig. 10

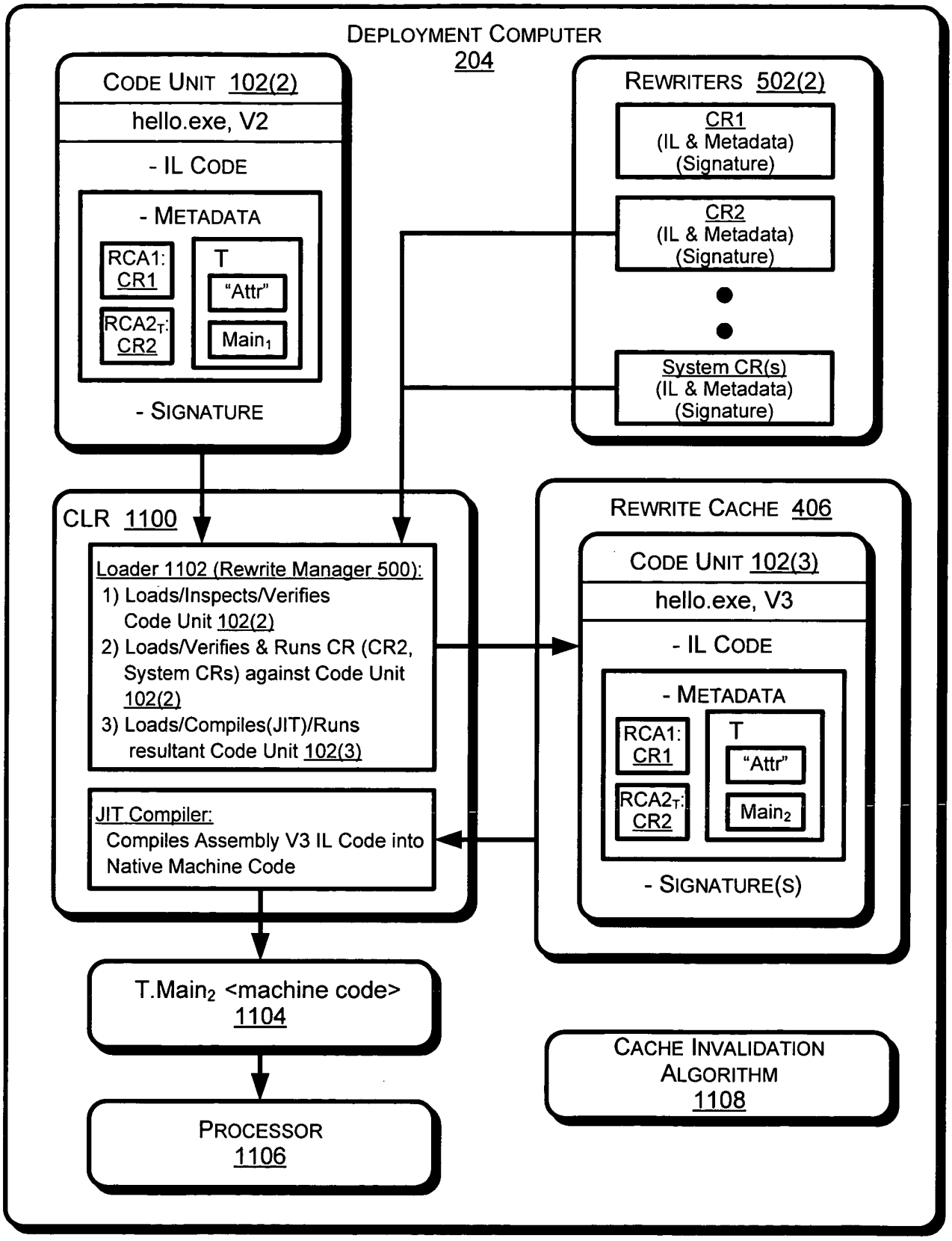
DEPLOYMENT COMPUTER
204
CODE UNIT 102(2)
hello.exe, V2
- IL CODE
- METADATA
RCA1: CR1
RCA2T: CR2
T
"Attr"
Main1
- SIGNATURE
REWRITERS 502(2)
CR1
(IL & Metadata)
(Signature)
CR2
(IL & Metadata)
(Signature)
System CR(s)
(IL & Metadata)
(Signature)
CLR 1100
Loader 1102 (Rewrite Manager 500):
1) Loads/Inspects/Verifies Code Unit 102(2)
2) Loads/Verifies & Runs CR (CR2, System CRs) against Code Unit 102(2)
3) Loads/Compiles(JIT)/Runs resultant Code Unit 102(3)
JIT Compiler:
Compiles Assembly V3 IL Code into Native Machine Code
REWRITE CACHE 406
CODE UNIT 102(3)
hello.exe, V3
- IL CODE
- METADATA
RCA1: CR1
RCA2T: CR2
T
"Attr"
Main2
- SIGNATURE(S)
T.Main2 <machine code>
1104
PROCESSOR
1106
CACHE INVALIDATION ALGORITHM
1108

Fig. 11

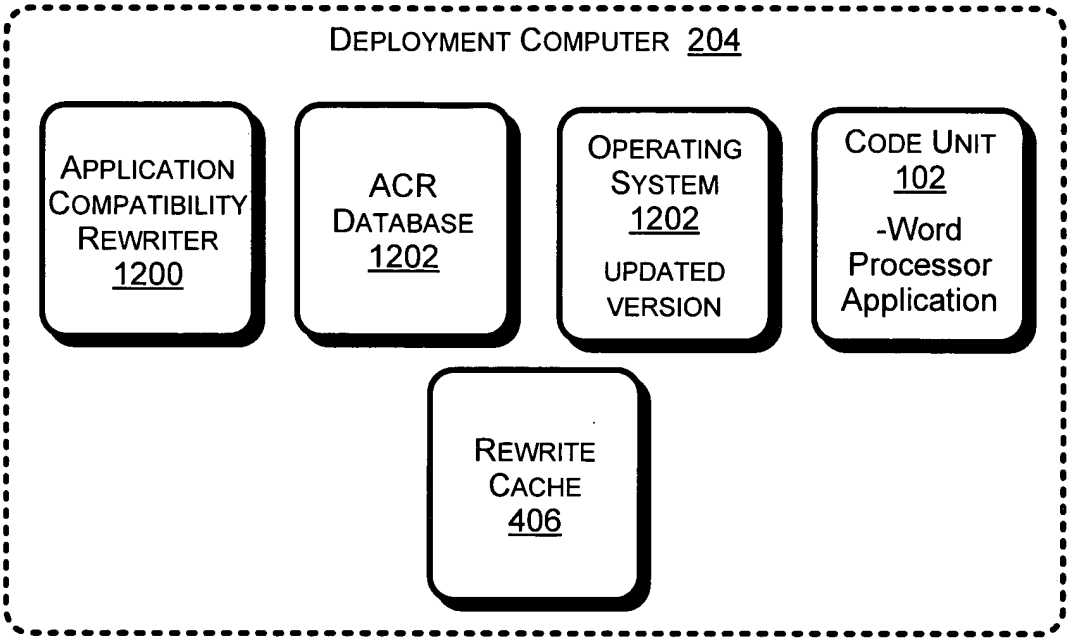
DEPLOYMENT COMPUTER 204
APPLICATION COMPATIBILITY REWRITER 1200
ACR DATABASE 1202
OPERATING SYSTEM 1202
UPDATED VERSION
CODE UNIT 102
-Word Processor Application
REWRITE CACHE 406

Fig. 12

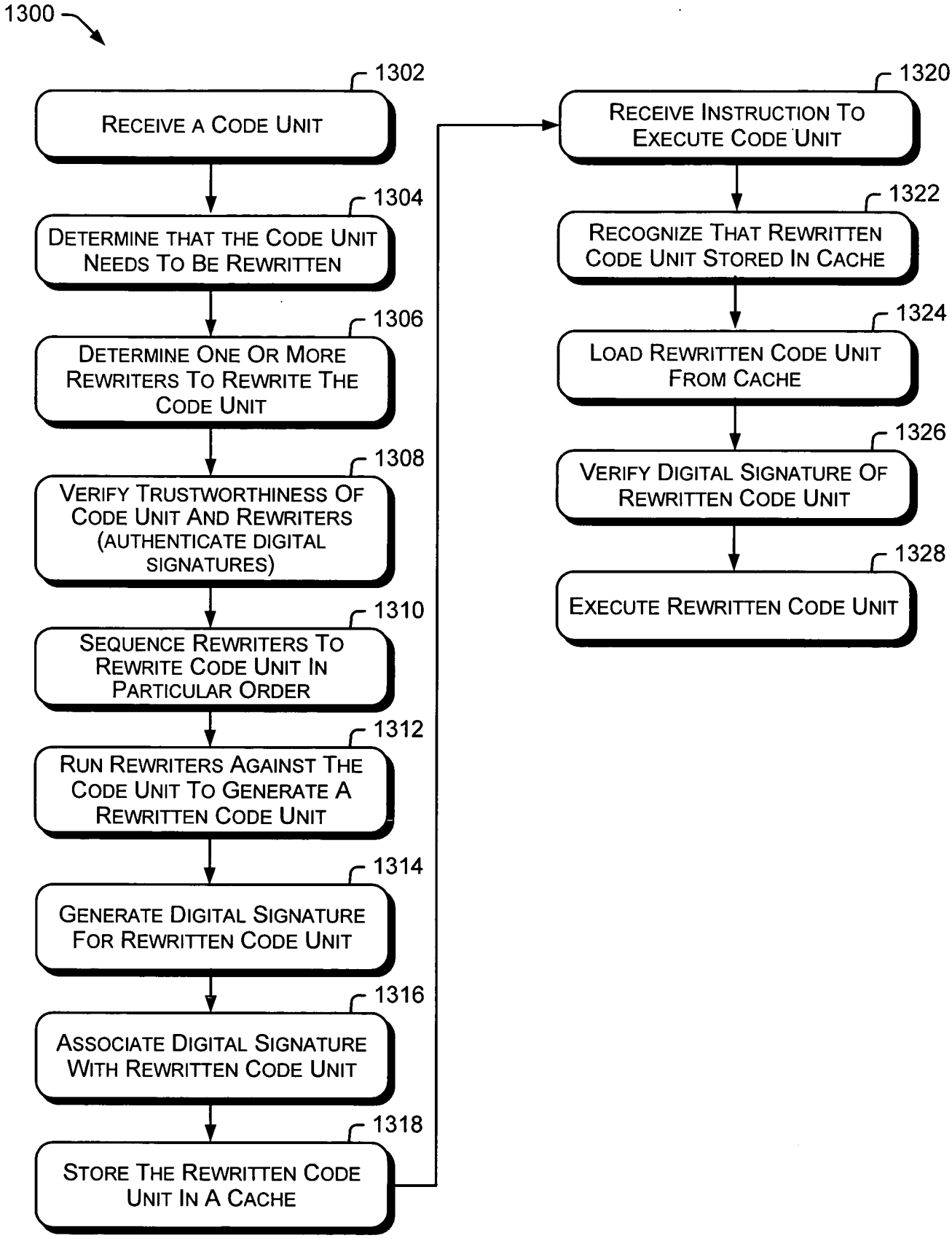
1300
1302
RECEIVE A CODE UNIT
1304
DETERMINE THAT THE CODE UNIT NEEDS TO BE REWRITTEN
1306
DETERMINE ONE OR MORE REWRITERS TO REWRITE THE CODE UNIT
1308
VERIFY TRUSTWORTHINESS OF CODE UNIT AND REWRITERS (AUTHENTICATE DIGITAL SIGNATURES)
1310
SEQUENCE REWRITERS TO REWRITE CODE UNIT IN PARTICULAR ORDER
1312
RUN REWRITERS AGAINST THE CODE UNIT TO GENERATE A REWRITTEN CODE UNIT
1314
GENERATE DIGITAL SIGNATURE FOR REWRITTEN CODE UNIT
1316
ASSOCIATE DIGITAL SIGNATURE WITH REWRITTEN CODE UNIT
1318
STORE THE REWRITTEN CODE UNIT IN A CACHE
1320
RECEIVE INSTRUCTION TO EXECUTE CODE UNIT
1322
RECOGNIZE THAT REWRITTEN CODE UNIT STORED IN CACHE
1324
LOAD REWRITTEN CODE UNIT FROM CACHE
1326
VERIFY DIGITAL SIGNATURE OF REWRITTEN CODE UNIT
1328
EXECUTE REWRITTEN CODE UNIT

Fig. 13

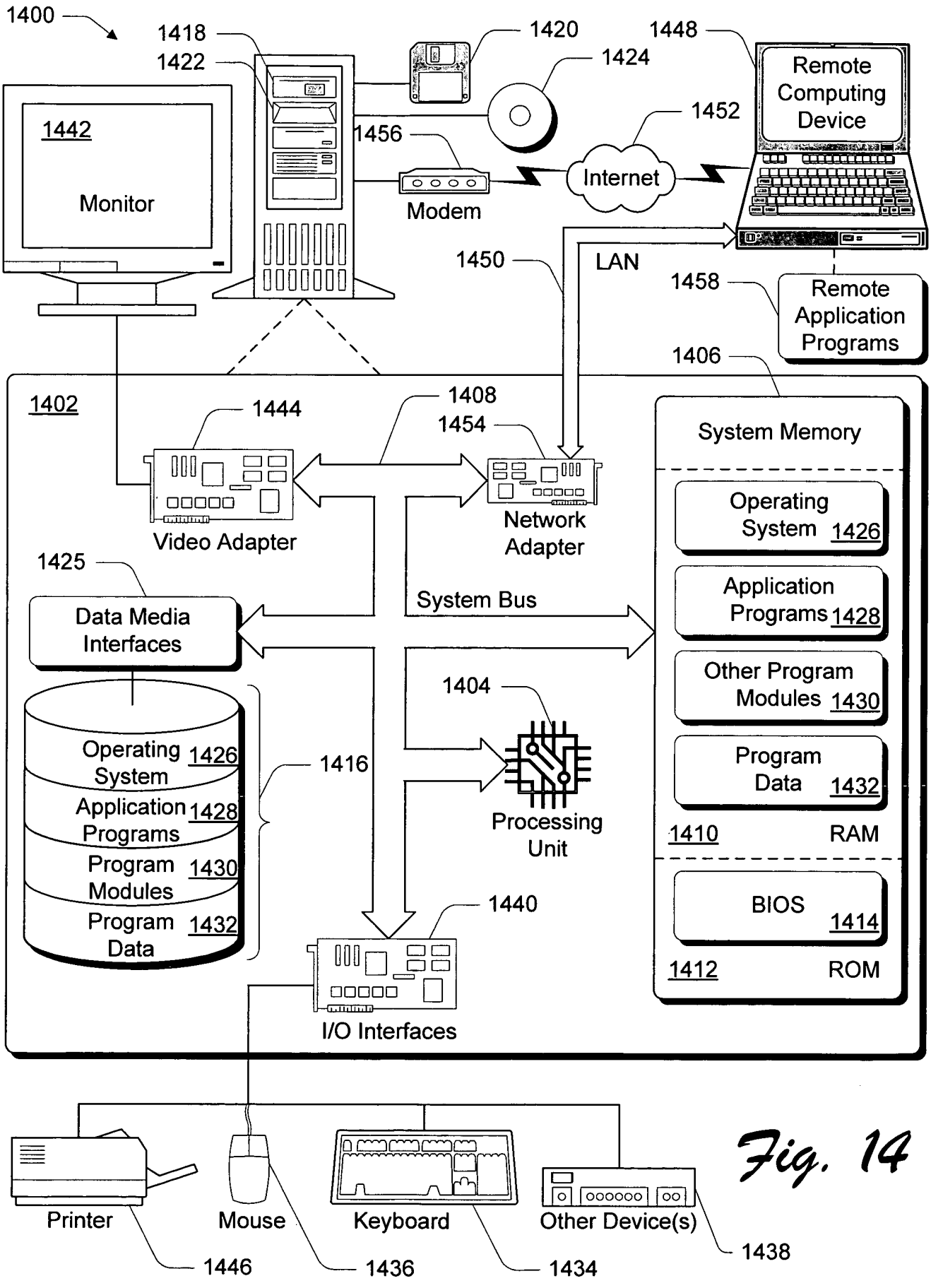
1400
1418
1422
1420
1424
1448
Remote Computing Device
1452
1442
Monitor
1456
Modem
Internet
1450
LAN
1458
Remote Application Programs
1406
1402
1444
1408
1454
System Memory
Video Adapter
Network Adapter
Operating System 1426
1425
Application Programs 1428
Data Media Interfaces
System Bus
Other Program Modules 1430
1404
Program Data 1432
1410
RAM
Operating System 1426
Application Programs 1428
Program Modules 1430
Program Data 1432
1416
Processing Unit
BIOS 1414
1440
1412
ROM
I/O Interfaces
Printer
Mouse
Keyboard
Other Device(s)
1446
1436
1434
1438

Fig. 14